

1 What is claimed is:

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3 1. A pointing system for pointing a boresight along a desired
4 line-of-sight in response to a command to point the boresight
5 along the desired line-of-sight, the system comprising,

6 a base for providing a platform and for coupling base motion
7 and line-of-sight motion of the boresight for providing a
8 mechanical excitation,

9 a gimbal system comprising an elevation gimbal and an
10 azimuth gimbal for positioning a boresight along the desired
11 line-of-sight relative to the base, the elevation gimbal and
12 the azimuth gimbal are modeled by a plant, the elevation gimbal
13 and the azimuth gimbal comprise a suspension modeled by a
14 compliance receiving the mechanical excitation and providing a
15 compliance signal, the elevation gimbal and the azimuth gimbal
16 are controlled by a torque signal being a sum of a compliance
17 signal and a drive signal,

18 a resolver system comprising an elevation resolver and an
19 azimuth resolver for respectively measuring as resolver
20 responses a relative elevation angle and a relative azimuth
21 angle of the boresight relative to the base,

22 a resolver filter system for resolver filtering of the
23 resolver responses for providing a filtered resolver response,
24 the mechanical excitation being applied to the resolver system
25 for providing the resolver responses,

26 a gyro system comprising X and Y and Z gyros for measuring
27 as gyro responses X and Y and Z angular rates of the base
28 motion,

1 a gyro filter for gyro filtering of the gyro responses for
2 providing filtered gyro responses, and

3 a controller comprising gimbal motors for receiving a
4 control input and providing motion control to the elevation
5 gimbal and the azimuth gimbal, the control input signal being a
6 sum of the command and the filtered resolver responses and the
7 filtered gyro responses.

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9 2. The system of claim 1 wherein,

10 the gyro system has high frequency responses effectively
11 attenuated by the gyro filter.

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13 3. The system of claim 1 wherein,

14 the resolver system has a high frequency response
15 effectively attenuated by the resolver filter.

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17 4. The system of claim 1 wherein,

18 the gyro system is an inertial reference unit.

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20 5. The system of claim 1 wherein,

21 the base motion comprises vibrations.

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23 6. The system of claim 1 wherein,

24 the base motion comprise trajectory motions of a moving
25 spacecraft coupled to the base.

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1 7. The system of claim 1 wherein,
2 the controller and plant and compliance and resolver system
3 are part of a closed-loop system having a system bandwidth,
4 the resolver system has a resolver frequency response
5 greater than the system bandwidth, and
6 the resolver filter serves to shape the resolver response
7 to reduce high frequency components of the resolver responses.
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9 8. The system of claim 1 wherein,
10 the controller and plant and compliance and resolver system
11 are a part of a closed-loop system having a system bandwidth,
12 the gyro system has a gyro frequency response greater than
13 the system bandwidth, and
14 the gyro filter serves to shape the gyro response to reduce
15 high frequency components.
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18 9. The system of claim 1 wherein,
19 the controller and plant and compliance and resolver system
20 and resolver system are part of a closed-loop system having a
21 system bandwidth,
22 the resolver system has a resolver frequency response
23 greater than the system bandwidth, and
24 the gyro system has a gyro frequency response greater than
25 the system bandwidth, the resolver frequency response is
26 greater than the gyro frequency response,
27 the resolver filter and gyro filter serves to match the
28 resolver frequency response to the gyro frequency response.

1 10. The system of claim 1 wherein,
2 the controller and plant and compliance and resolver system
3 and resolver system are part of a closed-loop system having a
4 system bandwidth,
5 the resolver system has a resolver frequency response
6 greater than the system bandwidth, and
7 the gyro system has a gyro frequency response greater than
8 the system bandwidth, the resolver frequency response is
9 greater than the gyro frequency response,
10 the resolver filter and gyro filter serves to match the
11 resolver frequency response to the gyro frequency response
12 above the system bandwidth.
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16 11. The system of claim 1 wherein,
17 the controller and plant and compliance and resolver system
18 are part of a closed-loop system have a system bandwidth, and
19 the gyro system is part of a feed forward loop.
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1 12. A pointing system for pointing a boresight along a desired
2 line-of-sight in response to a command to point the boresight
3 along the desired line-of-sight, the system comprising,
4 a base for providing a platform and for coupling base motion
5 and line-of-sight motion of the boresight for providing a
6 mechanical excitation,
7 a gimbal system comprising an elevation gimbal and an
8 azimuth gimbal for positing a boresight along the desired line-
9 of-sight relative to the base, the elevation gimbal and the
10 azimuth gimbal are modeled by a plant, the elevation gimbal and
11 the azimuth gimbal comprise a suspension modeled by a
12 compliance receiving the mechanical excitation, the elevation
13 gimbal and the azimuth gimbal are controlled by a torque signal
14 being a sum of a compliance signal from the modeled compliance
15 and a drive signal,
16 a gyro system comprising X and Y and Z gyros for measuring
17 as gyro responses the X and Y and Z angular rates of the base
18 having the base motion,
19 a gyro filter for gyro filtering of the gyro responses for
20 providing filtered gyro responses,
21 a controller comprising gimbal motors for receiving a
22 control input and providing motion control to the elevation
23 gimbal and the azimuth gimbal, the control input signal being a
24 sum of the command and the filtered gyro responses.
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1 13. A pointing system for pointing a boresight along a desired
2 line-of-sight in response to a command to point the boresight
3 along the desired line-of-sight, the system comprising,
4 a base for providing a platform and for coupling base
5 disturbances to the line-of-sight of the boresight for
6 providing a mechanical excitation,
7 a gimbal system comprising an elevation gimbal and an
8 azimuth gimbal for positing a boresight along the desired line-
9 of-sight relative to the base, the elevation gimbal and the
10 azimuth gimbal are modeled by a plant, the elevation gimbal and
11 the azimuth gimbal comprise a suspension modeled by a
12 compliance receiving the mechanical excitation, the elevation
13 gimbal and the azimuth gimbal are controlled by a torque signal
14 being a sum of a compliance signal from the modeled compliance
15 and a drive signal,
16 a resolver system comprising an elevation resolver and an
17 azimuth resolver for respectively measuring a relative
18 elevation angle and a relative azimuth angle of the boresight
19 relative to the base as resolver responses,
20 a resolver filter system for resolver filtering of the
21 resolver responses for providing a filtered resolver response,
22 the mechanical excitation being applied to the resolver system
23 for providing the resolver responses,
24 a controller comprising gimbal motors for receiving a
25 control input and providing motion control to the elevation
26 gimbal and the azimuth gimbal, the control input signal being a
27 sum of the command and the filtered resolver responses.
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